

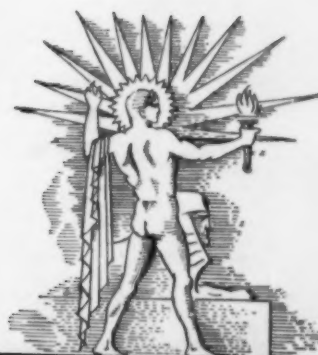
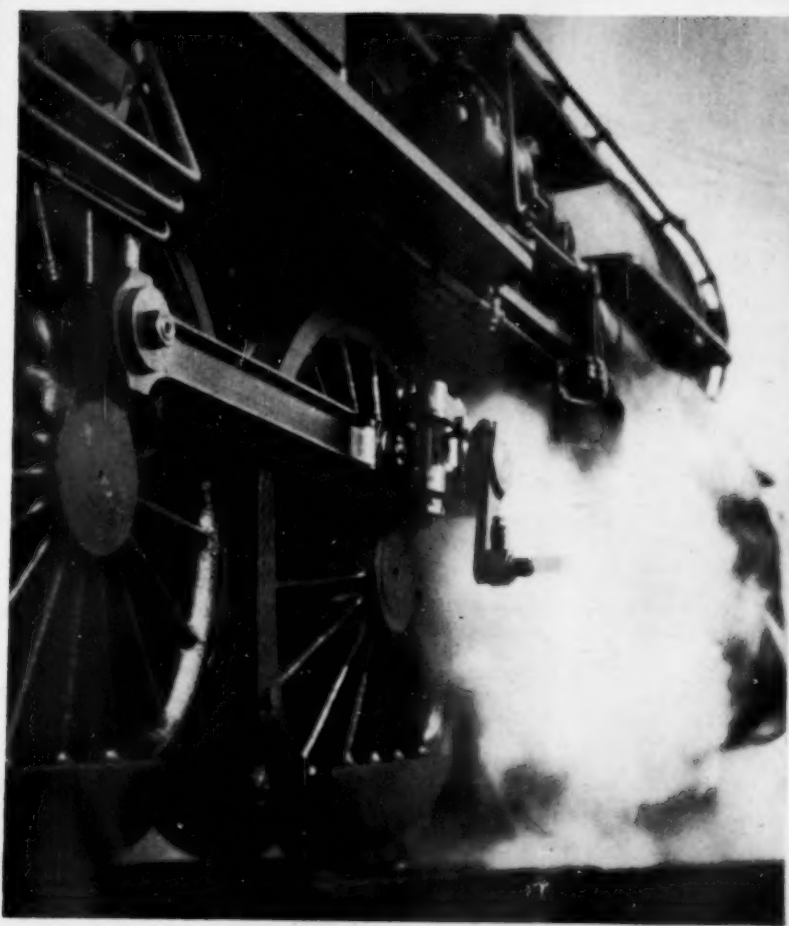
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SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE



JANUARY 17, 1931

A Romance of Power in Steel and Steam

See Page 35

A

SCIENCE SERVICE PUBLICATION

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Vol. XIX

No. 510

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Summary ofCurrent
Science

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DO YOU KNOW THAT

Castor oil is largely replacing mineral oil as a lubricant for automobile and airplane motors throughout France.

A law in Germany requires industrial concerns to employ a certain percentage of disabled persons, including the blind, but there is now agitation to repeal it.

A great international directory of botanists is being compiled and will be published shortly.

An albino rattlesnake, cream colored with pink eyes, is a feature of a collection of 153 rattlers recently obtained for the Natural History Museum of San Diego.

No less than 63 kinds of roses are being grown in an experiment station farm in Oregon to find out whether any will be successful as a source of perfume.

Lightning can be blown out of its path by the wind.

Covering fruit with a thin film of viscose is a new idea in fruit preservation.

Bringing "mountain air" to a tuberculosis sanatorium near Paris is accomplished by an "inhalatorium" in which patients take specially prepared air treatments.

A study of college presidents, based on 69 land grant colleges and universities, showed that a college president is likely to be about 55 years old, married, and the chances are that he will serve in his position not more than five years.

Armies of bark beetles, following up the drought, are preying upon the weakened forest trees with serious results.

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RAYS FROM LIVING TISSUE

By Dr. William Seifriz, of the University of Pennsylvania, who is one of the foremost of present-day investigators of the microscopic and ultra-microscopic details of the structure of living matter.

Friday, January 23, at 3:45 p. m., Eastern Standard Time

Over Stations of

The Columbia Broadcasting System

PHYSICS

Spring-Built Molecule Models Simulate Vibration of Atoms

Motion of Actual Molecules As Measured by Spectra Duplicated in Models at General Motors Laboratories

VIBRATIONS of steel balls and spiral springs now give science exact information on the motions occurring in actual molecules far too small to be seen with the human eye.

Dr. C. F. Kettering, general director of General Motors Research Laboratories, Dr. D. H. Andrews, now at the Johns Hopkins University, and L. W. Shutts, of the General Motors Laboratories, have agreeably surprised physicists all over the world by constructing mechanical models in which the various kinds of atomic vibrations occurring in, for instance, a molecule of benzene can be visually observed. These models reproduce the light radiations or spectra from liquid benzene.

The models are constructed of steel balls connected by spiral springs. The balls have the same relative weights as the carbon, hydrogen or oxygen atoms they represent. The web of balls and springs is freely suspended and connected to a vibrating rod whose speed can be varied by an electric motor. At definite frequencies of vibration, which are recorded on a counter, the model takes up a characteristic motion.

Those rates at which the model resonates are found to agree remarkably with the frequencies observed in light scattered by the substance.

Theory Borne Out

The investigators postulated that the forces connecting the atoms in a molecule are the same as if the atoms are connected by spiral springs. These forces were imagined to lie in the chemical bonds which elementary students of chemistry represent when they write chemical formulae.

A spring can either stretch or bend. Specific heat measurements previously made by Dr. Andrews showed that probably the same is true of the chemical bond. Equally surprising was the further result that the elasticity or springiness of all bonds is the same.

The first model made was of benzene, a molecule consisting of six atoms of carbon and six of hydrogen, and was

made rather diffidently. Definite numerical results were not expected. In constructing the model the springs had to be strong enough so that the stretching and bending forces on the balls would be large in comparison with gravitational forces. Also the balls and springs had to be so related that the vibrations would be of a speed that could be observed by the flickering light of a stroboscope. The models were suspended by thin rubber bands.

A stroboscope permits the observation of more rapid vibrations than can be seen with the naked eye if the frequency of the flicker is brought close to the frequency of the oscillations.

Chart of Vibration

A chart of the rates of vibrations was made. It was immediately recognized that the arrangement of lines was practically identical with those in the so-called Raman spectrum of benzene, which is also due to vibrations within the molecule. A simple calculation then enabled the investigators to convert the model's rates of vibrations into Raman frequencies.

The Raman spectrum is obtained by observing through a prism spectroscope the light scattered by a liquid or solid from a beam of light. Mercury arc light containing only single wavelengths was used. The original lines of the mercury spectrum are accompanied in the scattered radiation by subsidiary frequencies which are found, on examination, to be due to vibrations of parts within the molecule. These are also shown by the heat radiated by the substance. The 1930 Nobel prize winner in physics, Sir Chandrasekhara Venkata Raman, of the University of Calcutta, discovered the effect that bears his name.

The benzene model vibrated in several ways. The two halves sometimes vibrated like a bird flapping its wings, or three atoms went up while the alternate three went down, or all six atoms went in and out from the center.

Models of toluene, carbon tetrachloride, chloroform, ethane, ethylene, ace-



WATCHING ATOMS VIBRATE

Dr. Andrews, with the aid of the stroboscope, is observing motion much more rapid than can be seen with the unaided eye. A close-up of a model of the alcohol molecule is shown above.

tylene, ethyl and methyl alcohol were also made and found to give good agreement with their Raman radiations.

By watching the motion of the parts of these models, the chemist gets a real moving picture of the way the atoms are behaving in a chemical compound and this enables him to understand many obscure points of chemical behavior.

Science News Letter, January 17, 1931

ENGINEERING

An American Romance In Steel and Steam

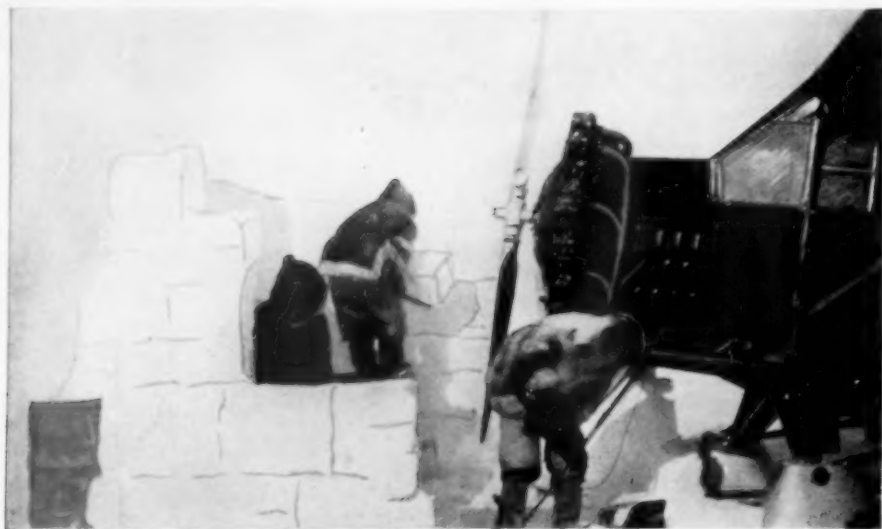
See Front Cover

THINGS mechanical offer the photographer an unlimited field for the exercise of his talents; and the locomotive, romantic and symbolical as it can be made, is especially attractive to him.

On the front cover of this week's SCIENCE NEWS LETTER, Photographer Rittase of Philadelphia has chosen the Boardwalk Flyer of the Reading Railroad as the subject of a fascinating study. The Boardwalk Flyer runs from Camden to Atlantic City and is considered one of the world's fastest trains.

This fact makes us look at the picture a second time. But the photographer might have done equally well with any other locomotive in the world, so universal is interest in the railroad.

Science News Letter, January 17, 1931



ESKIMOS BUILDING A SNOW HANGAR

Around the nose of an airplane in northern Canada to protect it from intense cold. It was 30 degrees below zero and the wind was blowing a 40-mile gale when this picture was taken.

AVIATION

Airplane Travel Develops Remote Canadian Wilds

AVIATION, man's newest mode of travel, is being rapidly used to locate and carry away the wealth of one of the world's most inaccessible and undeveloped regions.

Remote corners of Canada, which 10 years ago could be reached only after days of travel by dog team in winter and canoe or pack train in summer, are now at the most just two days' flight from the end of steel. J. A. Wilson, controller of civil aviation for the Dominion, has reported to the Empire Mining and Metallurgical Congress.

Strange methods are used in these distant lands. The noses of the planes are often housed in small igloo hangars built from snow and ice, sometimes with the help of Eskimos. Engines are thus protected from the intense cold so that hot oil will warm them up enough for starting.

The accompanying picture of Eskimos at work putting up an airplane igloo was taken in the heart of the Barren Lands just beneath the Arctic Circle. It was snapped by Norman Pearce of the *Northern Miner* in early April when the temperature was 30 degrees below zero and the wind was blowing a 40-mile gale.

Although all flying is done over land,

airplanes on wheels are never used. Northern Canada's myriads of lakes and rivers provide ready made alighting places for pontoons in summer and skis in winter. Caches of food, rifles and fuel have been set up at close intervals along the routes to sustain life in the wilds in case of forced landings.

But in spite of wildness and isolation, the climate and physical character of Northern Canada are favorable to flying, Mr. Wilson explained. There are few mountains. Though the climate is cold, the winters are dry. Visibility is good during all seasons. Flying is occasionally held up by blizzards, but the saving of time is so great that the loss of a day or two is negligible. Only one person has been killed by accident in remote northern flying.

The first regular air service was established in the summer of 1924 to give fast communication to an isolated mining community. One air transport company serving chiefly the mining areas has carried 23,341 passengers, 3,143,642 pounds of freight and 392,775 pounds of mail during a recent year. In 17,808 hours, 1,478,000 miles have been covered.

Four mining companies operating aircraft for their own use flew more than

527,000 miles in 5,392 hours during 1929. More than 11,000 hours were flown by forest patrol planes.

Science News Letter, January 17, 1931

ASTRONOMY

Pluto Discoverer Awarded British Medal and Prize

THE young assistant at the Lowell Observatory, C. W. Tombaugh, who first observed the trans-Neptunian planet, Pluto, is to be honored by the Royal Astronomical Society with the Hannah Jackson gift and medal.

This medal, which is accompanied by a cash award, is given at intervals of not less than three years nor more than seven, and is bestowed "for the invention of a new astronomical instrument or the discovery of a new astronomical body." The medal is of bronze and bears on one side the portrait of Sir William Herschel, who like Tombaugh began his astronomical career as highest awards of an astronomer.

The Society's gold medal is to be awarded to Dr. William De Sitter, Director of the Leiden Observatory in Holland. Perhaps the best known of his contributions is the prominent part he took in the early development of relativity, and his development of the "De Sitter universe" as a result. The gold medal is considered one of the highest awards that can come to an astronomer.

Science News Letter, January 17, 1931

MEDICINE

Fungus Causes Lung Disease Like TB

TWO types of fungi were found to be the probable cause of a lung condition resembling tuberculosis in a number of miners examined for evidence of that disease or of silicosis, Drs. R. R. Sayers and F. V. Meriwether of the U. S. Bureau of Mines have just reported to the U. S. Public Health Service.

The investigation was made in a group of lead and zinc miners. The persons having this fungus infection of the lungs did not complain of ill health and would not have seen a physician if it had not been for the routine examinations made of all the employees. In the course of this examination, the condition of the lungs was found. This resembled military tuberculosis, but no tubercle bacilli could be found. Further examination revealed the fungi.

Science News Letter, January 17, 1931

ANATOMY

Shoulder Blades Yield a Secret

**Will You Live Long and Well, or Will You Die Young?
Your Shoulder Blades Conceal a Clue to the Answer**

By WATSON DAVIS

YOUR shoulder blades may some day have a vital meaning to your physician. In their shape, whether they are convex, straight, or concave along their inner edges close to your spine, may lie an index as to whether you should guard yourself against illnesses or whether you can with due discretion take reasonable chances on your health.

For the last twenty-four years an eminent neuropsychiatrist of St. Louis, Dr. William W. Graves, has given close study to the meaning to be read in the fact, now verified in thousands of cases, that human beings, apes, monkeys and some other mammals have different scapula shapes. He has examined thousands of living persons of all ages of life, healthy and sick; he has studied thousands of carefully preserved human skeletons, and he has come to the startling conclusion that the type of these bones is some indication of the health potentialities of the person to whom they belong.

"Convex" shoulder blades belong to those who are more likely to live long, adapt themselves well to their surroundings and have few diseases, studies thus far indicate. "Straight" or "concave" shoulder blades belong to those who may have more than their share of disease, and often adapt themselves poorly to their environment and have shorter lives.

Unusually Constant

At this point you are probably feeling your own shoulder blades with mixed hope and fear. Let Dr. Graves reassure you. It is not possible for any person to determine with accuracy just what sort of shoulder blades he has. Even physicians generally have not yet learned the proper technique of diagnosing them.

Research has thus far failed to reveal any other physical characteristic common to human races which is so constant throughout the life of the individual and which may have so much useful meaning to the trained observer.

The original family upon which

shoulder blade observations were made has been watched by Dr. Graves for some twenty-four years and he has also kept records of more than 200 other individuals in various periods of life to determine whether the shape of their shoulder blades changed as they grew older.

Into the public schools and universities, army recruiting stations and homes for the aged, into hospitals, reformatories, and other institutions which house the more unfortunate members of society, Dr. Graves took his investigations. In a hospital for returned overseas men suffering from tuberculosis, among a thousand patients, there were found to be three and one-half times as many concave types of shoulder blades as in men from the same group at the time of their demobilization.

Such investigations as these bore out his early inferences that shoulder blades might serve as an indication to health potentialities.

The number of investigations that he was able to make in this way was relatively small when compared with the total number of people in the world and he therefore invited through papers in medical journals and lectures before medical societies further information on the relation of various physical characteristics to health.

He visited anthropological museums throughout the country and in Europe, studying the skeletons of ancient and modern man, apes and other mammals preserved there. He studied skeletons of different races of men and of man at all age periods from before birth to old age. At the Western Reserve University alone he studied 1,500 human skeletons or 3,000 shoulder blades. The 1,500 skeletons there represent approximately 75,000 years of human life.

In all the different subjects representing ancient and modern man and at all the ages he found the same three types of shoulder blades. In the tiny skeletons of unborn babies the shoulder blades were convex, straight, and concave. As early as the twelfth week of



DR. WILLIAM W. GRAVES

Shoulder blade expert, showing how to make the shape of the bone prominent. Years of study and classification of shoulder blade types have taught him their value as an index to health and longevity.

fetal life, the types are found to be as typical as at any life period. Apparently man has always had these three types of scapulae, even back in prehistoric days.

From his studies Dr. Graves has concluded that shoulder blades are just as characteristic of you as any part of your body. Barring the effect of diseases or poison, you inherit the type of your shoulder blades from your parents, just as you inherit the shape of your nose or ears. If both of your parents have convex shoulder blades yours will also be convex. If both your parents have concave shoulder blades, yours will be concave. But if one parent has concave shoulder blades and the other convex, yours will be concave or straight. There are some exceptions to these rules but Dr. Graves has found no features common to human beings more constantly transmitted from parent to offspring than shoulder blade types.

One of Dr. Graves' most interesting findings was that at certain ages one shoulder blade type was more frequent than the others. For example, two-thirds of the children under ten years have the scaphoid (straight or concave) types, but only one-third of the people between 70 and 80 years have these

types. On the other hand, two-thirds of the men and women of 70 to 80 years have the convex and only one-third scaphoid types of shoulder blades.

Not only did Dr. Graves find this curious occurrence of the different types at different age levels, but many other observers reported the same thing. The straight and concave types, which Dr. Graves groups under the name scaphoid, are more frequent to young people, but get less and less frequent in occurrence as the age of the people examined increases. The convex type becomes more and more frequent among the progressively older groups of men and women.

Puzzling over this, Dr. Graves thought that it might be explained in one of several ways. The change in type might be the natural result of growth and development; the concave type shoulder blades of the child might become straight and later still convex. The second explanation was that some childhood disease, particularly rickets, might change one type to another. The third explanation was that occupation and environment might change the type of shoulder blades as a man grew older.

Further study showed that none of these explanations was true. In the first place, it is extremely unlikely that the type of the shoulder blades would change materially during the normal processes of growth, or even under the influence of disease or occupation or environment. Biology has no examples of such changes in type during the life cycle. Nor is there any disease known which changes the type of a bone.

"I have found that each type is equally common in males and in females, and it is known that both sexes are subject to the same laws governing development, growth and old age," Dr. Graves said.

Only One Explanation

It has seemed to Dr. Graves and to many others following his work that there can be only one plausible explanation of why the straight and concave types occur more frequently in the young and the convex more frequently in the old. This explanation is that those who have straight and concave types are often the people who are unduly susceptible to disease, poorly adaptable and short-lived.

"However, one should not conclude that every person possessing straight or concave types of shoulder blade is a weakling and will die young," warned Dr. Graves. "I have found that some of

the best types, both physically and mentally, are possessors of straight and concave shoulder blades, and some of the worst types are possessors of convex shoulder blades.

"It cannot be too strongly emphasized that a shoulder blade type should never be used as a positive index of a person's constitution or his tendency toward disease or health with the anticipation that the possessor of the one

type will die young and the possessor of the other will live to old age."

The person with an inherent susceptibility to disease must be strengthened and given special guidance and protection. Dr. Graves calls this susceptibility the soil factor. Shoulder blade types may have their greatest usefulness in aiding the physician to recognize this soil factor.

Science News Letter, January 17, 1931

CHEMISTRY

Margarin Made From Palm Oil Becomes Competitor of Butter

PALM OIL, heretofore used mainly in soap making, is proving a slippery customer for the butter makers who thought they had their market well protected by means of a ten-cent per pound tax on artificially colored oleomargarin.

Margarin makers have been experimenting with palm oil for some time. Lately they have succeeded in refining it to a point where it would not give a peculiar taste to margarin.

On Nov. 20 last they asked for a ruling from Internal Revenue Commissioner David Burnett as to whether margarin made with palm oil would be subject to the ten cent tax. They pointed out that the yellow color of this margarin was not produced artificially but came as a result of using the unbleached palm oil itself.

The Commissioner read the law and noticed the words "artificially colored" and ruled that palm oil margarin did not come within the scope of the law. Straightway one manufacturer ordered 700 barrels of palm oil and the wholesale price of butter fell. Protests from the dairy industry and from congressional representatives from dairy states immediately followed. The commissioner has been in many conferences during the past few weeks with representatives of the dairy industry, representatives of the oleomargarin industry, and congressmen.

It is the consensus of opinion that in order to take care of the palm oil competition the law will have to be amended. There is every desire to guard the butter industry of the country, inasmuch as butter and milk contain highly necessary vitamins for both children and adults.

In fact, so desirous is Congress of guarding the dairy industry that it is very probable that an embargo will soon be placed on imported butter and cheese for a period of about one year in order that conditions may better themselves in this country for the producer. Dairy men are pointing out that with conditions as they are at present palm oil margarin might be marketed as real butter.

Science News Letter, January 17, 1931

ELECTRICITY

Hot Photocells Give Largest Currents

THE photoelectric cell, magic lamp that has made possible television and talking movies, yields the most electric current when it is hot—at a temperature of a little less than 1,400 degrees Fahrenheit.

To the American Physical Society in Cleveland, Dimiter Ramadanoff, instructor in electrical engineering at Cornell University, reported his researches on the effect that temperature has on the current that comes from the photocell when light shines on it. With cells using the metal barium, he found that the current increased greatly as the temperature was raised, and was at a maximum around 1,364 degrees Fahrenheit. He also found a secondary maximum for the current at 1,040 degrees, but this was only observed when the cell was illuminated with an intermittent light.

Science News Letter, January 17, 1931

An old Roman inscription, lately deciphered, is a will in which money was left for the support of one hundred orphan girls.

RADIO

Synchronized Broadcasting Successful in Six-Month Test

Radio Commission Authorizes More Stations of Same Wave Length to Transmit Same Programs Simultaneously

A DEMONSTRATION of the success of synchronized radio broadcasting—that is, broadcasting by two different stations of the same program on the same wavelength, is afforded by two Iowa stations that have just completed six months of such operations. Stations are WHO, Des Moines, and WOC, Davenport. Glenn D. Gillett, engineer in the Radio Development Department of the Bell Telephone Laboratories of New York, has just made a full report of the technical features of the system. He supervised its installation.

The stations are operated by the Central Broadcasting Co., of Iowa, and until last winter they shared time on a frequency of 1000 kilocycles. The two cities are about 153 miles apart. Each station could only give effective service within a radius of about 50 miles, so neither city was able to receive satisfactory service all of the time, even though both stations might be broadcasting the same program.

Without special means of control, two stations cannot keep on precisely the same frequency. They may keep close enough to the exact frequency assigned to satisfy the requirements of the Radio Commission, but very slight differences between them cause the two sets of waves to interfere, with disastrous results for the listener.

Since June WHO and WOC have been synchronized, with the result that about 1,000,000 people, who formerly received adequate service from these stations about half the time, now receive it all the time. This is accomplished by means of a newly developed crystal control that is much more precise than older devices of the same kind.

However, it is not possible, even with this, to maintain absolute synchronism all the time, so a special listening station was established about half way between the two cities. WHO is the standard, and the monitoring station picks up the broadcast program, whence it is sent back to WOC by telephone wires. When WOC begins to vary from synchronism, this received pro-

gram becomes slightly fainter, and the operator readjusts the transmitter. The adjustment is so delicate that a complete revolution of the control dial varies the WOC carrier frequency by but one part in a million. While broadcasting, an adjustment is made every 15 minutes.

Other broadcasters are also conducting experiments with synchronized broadcasting, and experts expect that it will soon come into general use. Thus a number of frequencies will be freed for other broadcasters, so that the crowded condition of the ether will be partly relieved.

In addition to the two Iowa stations several others have been authorized by the Federal Radio Commission to conduct similar tests or actually to broadcast in synchronism. The new KDKA station at Saxonburg, Pa., is operating in synchronism with its old transmitter at East Pittsburgh. Station WHK, Cleveland, is operating in synchronism with WABC, New York, and WKBW, Buffalo, is also authorized to operate in the same hook-up.

A more complicated arrangement is that in effect between WEA and WJZ,

New York, WTIC, Hartford, and WBAL, Baltimore. Normally, WBAL shares time with WTIC on a cleared channel. However, WBAL is authorized to synchronize with WJZ and WTIC with WEA. The plan is that when WTIC is using the joint frequency, WBAL will broadcast the WJZ program on that station's wavelength. When WBAL is using the channel, however, WTIC broadcasts the WEA program and on the same frequency.

Science News Letter, January 17, 1931

ARCHAEOLOGY

Bronzes Lent By Boston To Grace Persian Exhibit

FIFTY-EIGHT remarkable bronzes from ancient Persia, which came to the Museum of Fine Arts, here, this summer, have taken an ocean voyage to London to be on display at the Persian Exhibition which opened there this month.

The bronzes are chiefly from ancient graves dating somewhere between 1500 and 500 B. C. The objects are chariot fittings, horse trappings, articles of personal adornment, household utensils, tools, and weapons.

The source of these bronzes is Luristan, a mountain province of western Persia, near Baghdad. From these mountains, within the past year, the first of the articles came to light with dramatic suddenness. No organized archaeological expedition opened up the new field of discovery. Local tribesmen found the first objects by accident.

Science News Letter, January 17, 1931



A SPIRITED PERSIAN STEED

Was doubtless controlled by his master 3,000 years ago through the pull of the reins on this bit in his foaming mouth. It is one of 58 remarkable bronzes now on display in London which came to light during the past year with dramatic suddenness.

MEDICINE

**Stabilized Death Rate
From Cancer Predicted**

OPTIMISM and determination were the guiding spirits which pervaded the cancer symposium held in Washington under the auspices of the National Institute of Health.

Not even the statement by Dr. J. W. Schereschewsky of the U. S. Public Health Service, that cancer has undeniably increased, dampened the hopeful, fighting spirit of these men.

"The conclusion was reached that in the 21-year period from 1900 to 1920, about two-thirds of the increase observed in the cancer death-rate of persons 40 years and over was due to an actual increase in the mortality from the disease," he said.

"We may venture to hope that the cancer death-rate will not continue to grow indefinitely," he continued. All physical, chemical and biological processes tend to a state of equilibrium. Even without the discovery of preventive measures, the cancer death-rate will sooner or later become stabilized, he ventured to predict.

Science News Letter, January 11, 1931

PALEONTOLOGY

**Discoverer Challenges
Dinosaur Egg Speculation**

PROTESTING against speculations about the presumed dinosaur egg fragments discovered by him last summer near Red Lodge, Montana, Dr. Glenn L. Jepsen, of Princeton University, reports to the scientific journal, *Science*, additional details of his explorations.

"Some newspaper reports have incubated the small fragments of shell so assiduously in the desire for 'bigger and better' eggs that the resultant hatch reveals a number of amazing and monstrous hybrids," Dr. Jepsen declares.

"A foreign publication reports that the eggs found were eight feet long. In America an editorial discloses the delight of collectors in finding a whole nest of complete eggs after a gruelling search, and draws a moral therefrom. Another correspondent intimates that, since the Montana shell scraps are nearly black, the parent dinosaurs were black.

"The reappearance of the postulation that dinosaurs had extinction forced upon them by the egg eating habit of some of the contemporary mammals is

one of the examples of atavism among the recent brood of mystic reports."

Dr. Jepsen's report tells how he and E. J. Moles, Jr., a senior geology student at Princeton, found several pieces of fossil eggshell, none over an inch in length, on the surface of a shale deposit which they were exploring with the hope of determining its relation to other geological formations. That these fragments are part of a dinosaur egg cannot be absolutely proved at the present time.

Science News Letter, January 17, 1931

ICHTHYOLOGY

**Millions of Mussels
Concentrated In Tiny Vials**

THE much-battered old Latin phrase, "multum in parvo," which in plain English means "much in little," is most literally realized in two small vials recently accessioned by the U. S. National Museum.

One vial, in about three-quarters of a cubic inch of space, contains 1,265,920 animals. The other, in about half a cubic inch, contains 568,600 animals.

The animals, to be sure, are rather small. They are the extremely young infants of two species of Mississippi river mussels, very little past the egg stage, and are technically known as "glochidia." They are so small that if you want to look at them you have to use a microscope.

Pearl shirt buttons are made from glochidia.

Science News Letter, January 17, 1931

ECONOMICS

**Hard for Mathematics to
Keep Up With Depression**

MATHEMATICAL theory, as well as business men and investors, finds it difficult to keep up with the speedy movements of prices and supply and demand when economic conditions come to a crisis.

Dr. G. C. Evans, of Rice Institute, Houston, Tex., in an address before Statisticians and Mathematicians meeting with the American Association for the Advancement of Science in Cleveland, explained that the tendency of prices to continue to rise and fall once they have started is explained by simple economic theory, but in a crash like that which the stock market has been through the accepted fundamental assumptions no longer hold.

Science News Letter, January 17, 1931

IN SCIENCE

NATIONAL PARKS

**Bryce Canyon National Park
More Than Doubled in Size**

MORE than doubling the area of one of the newest national parks, Bryce Canyon, in Utah, President Hoover has by proclamation added lands increasing its area from 14,480 to 30,560 acres. The newly-acquired lands were transferred from the Powell National Forest, upon the joint recommendation of the Secretary of the Interior and the Secretary of Agriculture.

The added territory includes several superbly colored canyons, as well as one elevated point which permits an uninterrupted sweep of vision around almost a complete circle, providing distant outlooks upon mountain ranges in five different states.

Science News Letter, January 17, 1931

ASTRONOMY-RADIO

**1931 Radio Forecast
Made By Dr. Stetson**

RADIO forecast for 1931: Slightly inferior radio reception during the early part of the year with marked improvement during the latter half.

This was announced to the American Association for the Advancement of Science in Cleveland by Dr. Harlan T. Stetson, director of Perkins Observatory, Delaware, Ohio, as a result of his studies of the connection between sunspots and radio reception.

The more spotted the sun, the less easily can you bring in loud and clear that distant radio station. For over five years Dr. Stetson has been measuring the variation of radio reception in relation to the sunspots.

For several years his radio predictions have been fulfilled. A year ago he foresaw the remarkable increase in radio reception that last summer brought. The common idea is that radio reception is worse during the summer, but that was not the case last summer. With increasing sunspots during the past three months, radio signal strength has suffered a notable decrease.

Science News Letter, January 17, 1931

SCIENCE FIELDS

BACTERIOLOGY

Tubercle Bacillus Killed By Part of Itself

NEW progress in the inquiry into the chemical nature of the bacilli of tuberculosis, was reported to the American Association for the Advancement of Science in Cleveland, by Prof. R. J. Anderson, of Yale University, one of the scientists co-operating in a joint offensive on the tubercle bacillus by the National Tuberculosis Association. Millions of germs have been analysed and in the fatty portions have been found many unusual compounds, including a sugar that kills those infected and is harmless to those who are well.

Now experiments by some of Dr. Anderson's fellow workers indicate that one portion of the fat from the germ actually is antagonistic to the germ itself and acts as a true antigen. This may prove to be of practical use eventually in the control of tuberculosis.

An acid new to chemistry that is the cause of the formation of the tubercular tissues has been isolated from the fat of the tubercle bacillus by Dr. Anderson and named phtioic acid. Thus a chemical causing the symptoms of tuberculosis has been found.

Science News Letter, January 17, 1931

ARCHAEOLOGY

Lion, Gaming Pieces Among Palestine Ruins

A STONE lion, crude to look at but rarely interesting because it belonged to those arch-enemies of the Children of Israel, the Canaanites, is one of the season's prizes of excavations at Tell Beit Mirsim, in Palestine, reported by Prof. W. F. Albright, of the Johns Hopkins University.

The mound known today as Tell Beit Mirsim is considered to have been the Biblical town of Kirjath-Sepher, a Canaanite stronghold taken by Caleb's army when he was attempting to establish the Israelites in the Promised Land, about the thirteenth century B. C.

The site is being excavated from year to year by the Xenia-Pittsburgh Theo-

logical Seminary and the American Schools of Oriental Research, with Prof. Albright as one of the directors of excavation.

Prof. Albright explains that the stone lion of the Canaanites was presumably one of a pair of these beasts which guarded the entrance to a shrine. A foot or so away from the lion was found a stone table of offerings, with three carved lions' heads projecting from the rim. These two objects were obviously from a nearby sanctuary of a Canaanite deity. Prof. Albright suggests that they must have been thrown out when the Canaanite city was destroyed, perhaps tossed away by the Israelites as trappings of the false gods that Jehovah abominated.

The ruins of a palace which stood at Kirjath-Sepher centuries before the Israelites came into Palestine were also excavated by the expedition. In the palace ruins a set of gaming pieces was found, showing that a kind of backgammon was played in Palestine in the seventeenth century B. C. A set of pyramid and cone-shaped counters and the ivory dice were all complete.

Science News Letter, January 17, 1931

DISCOVERY

Canadian Claim To Islands Is Recognized

CANADIAN title to the Arctic islands discovered by Commander Otto Sverdrup, leader of the Norwegian Polar Expedition in the years 1898-1902, and named for him, has been formally recognized by the government of Norway.

There are four islands in the group, which are located west of Ellesmere Island in an area the center of which is about 11 degrees or approximately 700 miles from the North Pole. In 1900 Commander Sverdrup took possession of the islands in the name of his sovereign, but no further act of occupation took place. Canada, however, had long claimed sovereignty over the entire area north of the mainland.

Canada has also acquired, by purchase, valuable original maps, notes, diaries, and other documents relative to the explorations and discoveries of Commander Sverdrup. At the last session of Parliament the Dominion Government made provision to cover a grant of \$67,000 to Commander Sverdrup in recognition of his work in the Canadian North and to purchase his records.

Science News Letter, January 17, 1931

ICHTHYOLOGY

Goldfish in Groups Learn More Quickly

THE old feeble pun, that asks what fish learn in their schools, looks as though it will have to be called in and repainted. It appears that fish really do learn in schools.

At the meeting of the American Society of Zoologists in Cleveland, Dr. Carl Welty of Parsons College told of experiments he conducted at the University of Chicago on goldfish. He wanted to find out how quickly they would learn their way about in a maze which he put into their tank, to get at food at the other end. He put them into the maze singly, in pairs, and in groups of four and eight.

On the average, the larger groups found their way through more quickly than did the singles or the groups of two. Collective wisdom seemed to be better than solitary sagacity.

When "educated" fish, that have learned their way through the maze, are added to groups of newcomers, these composite groups under experienced leadership find their way about more quickly than do control groups of similar size without an "old-timer" in their midst.

Science News Letter, January 17, 1931

ASTRONOMY

Another Early Pluto Picture Found in Germany

THOUGH Pluto, the trans-Neptunian planet, was not actually discovered until January, 1930, when astronomers at the Lowell Observatory, in Arizona, picked it up in the course of a search for such a body, it was photographed as early as January 23, 1914, a few days more than 16 years earlier. This photograph is, so far as known, the first record of Pluto.

The 1914 plate was taken through a telescope at the Königstuhl Observatory, at Heidelberg, and the plate was found by Dr. Max Wolf, director of the observatory, who was searching for such an early photograph.

Until now, the earliest known photograph of Pluto was one taken in 1915 at the Lowell Observatory itself. It is likely that Professor Lowell actually handled this plate, and saw the image of Pluto on it, but among thousands of star images, it could not then be identified.

Science News Letter, January 17, 1931

PHYSICS

More Than 99 Per Cent Steam Wasted by Big Boat Whistles

Siren Type Signals Found More Efficient Than Whistle in Tests Conducted by U. S. Naval Proving Grounds

MARK TWAIN was not so far off when he told of the river steam-boat which had to stop to get up enough steam to blow the whistle. According to a report of Louis Thompson of the U. S. Naval Proving Grounds, Dahlgren, Va., a large steam whistle consumes an unreasonably large amount of power. A 12-inch whistle may consume as much as 400 horse-power. The report was given in a discussion of signal efficiency at the meeting of the Acoustical Society of America in Los Angeles.

In precise scientific tests steam whistles made a pitiful efficiency score. Using several hundred horse-power, the ten- and twelve-inch whistles wasted over 99 per cent. of the energy supplied. The balance was, of course, transformed into actual sound energy.

These investigations are being carried on by government authorities in quest principally of more effective fog signals. They disprove, among other things, the popular notion that sound

travels farther in a fog than in clear air. In fact the fog seems to have but a negligible influence either way. Wind and air eddies are of much greater importance. In one test a ten-inch whistle, using two hundred horse-power, was heard only three miles away in the face of unfavorable wind, while at another time a two-inch whistle, using but two horse-power, was heard five miles distant. Hot and cold layers of air are found to refract the sound and ruin signal values.

In the tests measurements of sound values are taken over wide areas, both over land and sea, using modern electrical recording instruments. The siren type of signal excels the whistle by a wide margin. In one of the best of these devices air is forced out through peripheral ports by centrifugal action, giving signals audible at a great distance.

The designers of such sound producers are studying the differences between the wave forms of the natural sounds of a turbulent sea, and those which they wish to be heard. It is found further that the plan of varying the sound in an irregular manner introduces the element of surprise and increases audibility. This is in contrast to the old idea of a continuous low sound of a fog horn or whistle. Signals of 180 to 300 vibrations per second are best heard. These correspond to the middle range of the piano keyboard.

Science News Letter, January 17, 1931

ASTRONOMY

Christmas Eve Meteor May Have Showered Stones

THE METEOR that flashed over Idaho on Christmas eve was heard over a greater area than the famous Tilden, Illinois, fall of 1927 from which important stones from the sky or meteorites were recovered, Prof. C. C. Wylie of the State University of Iowa declared to Science Service, basing his

opinion on the first reports of the meteor.

But the Idaho meteor probably covered a smaller area than the Paragould, Arkansas, fall of last year which set a new record for the recovery of meteorites seen to fall.

"If reports from points in Idaho, Washington, Oregon and Montana are obtained, giving the direction in which the meteor was seen and its path in the sky," Prof. Wylie explained, "the orbit in which the meteor was travelling before it entered the earth's atmosphere can be computed. But this is not sufficient for locating this meteorite which may have reached the earth."

"The ball of fire appearance for the meteor probably ended at a height of fifteen miles and any surviving stones, falling from there as dark objects, would be invisible at night. If meteorites fell in a well settled district in Idaho, a study of the sounds heard by various persons should locate the place of fall well enough for the purposes of search. A large meteor after bursting often scatters stones over an area ten miles long and three miles wide. But the stones are found only after some search."

Science News Letter, January 17, 1931

ELECTRICITY

New Vacuum Tube Detects Smallest Electric Current

THE smallest electric current ever measured—about one three-hundred-quadrillionth of the current required to light an ordinary 100-watt electric bulb—can be detected with the aid of a new vacuum tube developed at the research laboratory of the General Electric Co., under the direction of Dr. A. W. Hull.

Such a current consists of a flow of only 30 electrons a second. The number of electrons flowing through the 100-watt lamp in a second can be expressed by a ten followed by 18 ciphers.

Speaking in Cleveland before the American Physical Society, Prof. L. A. DuBridge, of Washington University, told of his researches with this new tube. In the past, he said, small currents have been measured with an electrometer, which is rather a troublesome instrument with which to work. The new tube can amplify currents smaller than one ten-quadrillionth of an ampere, too minute to operate an electrometer. Dr. DuBridge also pointed out that the tube is much more convenient than the electrometer.

Science News Letter, January 17, 1931



A GREAT LOSS

Of energy takes place when the engineer blows this whistle, and the same is true of all the other steam whistles in the world.

GENETICS

The Theory of The Gene

"A Classic of Science"

Dr. Morgan's theory explains the mechanism by which inherited traits, following the laws of Mendel, are handed on, in various combinations, from generation to generation.

THE THEORY OF THE GENE, by Thomas Hunt Morgan. New Haven, MDCCCXXVI (1926).

MENDEL'S paper was recovered in 1900. Four years later Bateson and Punnett reported observations that did not give the numerical results expected for two independent pairs of characters. For instance, when a sweet pea having purple flower-color and long pollen grains is crossed to one with red flowers and round pollen grains, the two types that go in together come out together more frequently than expected for independent assortment of purple-red and long-round. They spoke of these results as due to repulsion between the combinations purple and long and red and round, that went from opposite parents. Today these relations are called linkage. By linkage we mean that when certain characters enter a cross together, they tend to remain together in later generations, or, stated in a negative way, certain pairs of characters do not assort at random.

It would seem, then, so far as linkage holds, that there are limits to the subdivision of the germinal material. For example in the vinegar fly, *Drosophila melanogaster*, there are known about 400 new mutant types that fall into only four linkage groups.

One of these groups of characters of *Drosophila* is said to be sex-linked, because in inheritance the characters show certain relations to sex. There are about 150 of these sex-linked mutant characters. Several of them are modifications of the color of the eye, others relate to its shape or its size, or to the regularity of the distribution of its facets. Other characters involve the body color; others the shape of the wings, or the distribution of its veins; others the spines and hairs that cover the body.

A second group of about 120 linked characters includes changes in all parts of the body. None of the effects are identical with those of the first group.

A third group of about 130 characters also involves all parts of the body. None of these characters are the same as those of the other two groups.

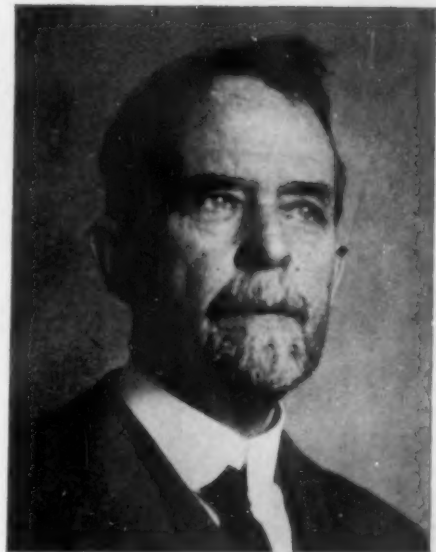
There is a small fourth group of only three characters: one involves the size of the eyes, leading in extreme cases to their total absence; one involves the mode of carriage of the wings; and the third relates to the reduction in size of the hairs.

The method of inheritance of linked characters is given in the following example. A male *Drosophila* with four linked characters (belonging to the second group), black body color, purple eyes, vestigial wings, and a speck at the base of the wings, is crossed to a wild type female with the corresponding normal characters, that may be called gray body color, red eyes, long wings, and absence of speck. The offspring are wild type. If one of the sons is now crossed to a stock female having the four recessive characters (black, purple, vestigial, speck), the offspring are of two kinds only, half are like one grandparent with the four recessive characters, and the other half are wild type like the other grandparent.

Two sets of contrasted (or allelomorphic) linked genes went into this cross. When the germ-cells in the male hybrid matured, one of these sets of linked genes went into half of the sperm-cells and the corresponding allelomorphic set into the wild type half of the sperm-cells. This was revealed, as described above, by crossing the hybrid (F₁) male to a female pure for the four recessive genes. All of her mature eggs contain one set of four recessive genes. Any egg fertilized by a sperm with one set of the dominant wild type genes should give a wild type fly. Any egg fertilized by a sperm with the four recessive genes (which are the same as those in the female here used) should give a black, purple, vestigial, speck fly. These are two kinds of individuals obtained.

Crossing-Over

The members of a linked group may not always be completely linked as in the case just given. In fact, in the F₁ female from the same cross, some of the recessive characters of one series



DR. THOMAS HUNT MORGAN
Formulator of the theory of the genes as bearers of heredity.

may be interchanged for wild type characters from the other series, but even then, since they remain united more often than they interchange, they are still said to be linked together. This interchange is called crossing-over, which means that, between two corresponding linked series, there may take place an orderly interchange involving great numbers of genes . . .

Linear Order of the Genes

It is self-evident that if two pairs of genes should be near together, the chance that crossing-over occurs between them is smaller than if they are further apart. If two other genes are still further apart the chance of crossing-over is correspondingly increased. We may utilize these relations to obtain information as to the "distance" at which any two pairs of elements lie with respect to each other. With this information we can construct charts of the series of elements in each of the linkage groups. This has been done for all the linkage groups of *Drosophila* . . .

In the preceding illustrations of linkage and crossing over, that have been given, the genes are represented as lying in a line—like beads on a string. The numerical data from crossing-over

show, in fact, that this arrangement is the only one that is consistent with the results obtained, as the following example will serve to illustrate.

Suppose that crossing-over between yellow wings and white eyes occurs in 1.2 per cent of cases. If we then test white with a third member of the same series, such as bifid wings, we find 3.5 per cent of crossing-over. If bifid is in line and on one side of white it is expected to give with yellow 4.7 per cent crossing-over, if on the other side of white it is expected to give 2.3 per cent of crossing-over with yellow. In fact, it gives one of these values, namely, 4.7. We place it, therefore, below white in the diagram. This sort of result is obtained whenever a new character is compared with two other members of the same linkage group. The crossing-over of a new character is found to give, in relation to two other known factors, either the sum or the difference of their respective cross-over values. This is the known relation of points on a line, and is the proof of the linear order of the genes; for no other spatial relation has yet been found that fulfills these conditions.

Theory of the Gene

We are now in a position to formulate the theory of the gene. The theory states that the characters of the individual are referable to paired elements (genes) in the germinal material that are held together in a definite number of linkage groups; it states that the members of each pair of genes separate when the germ-cell matures in accordance with Mendel's first law, and in consequence each germ-cell comes to contain one set only; it states that the members belonging to different linkage groups assort independently in accordance with Mendel's second law; it states that an orderly interchange—crossing-over—also takes place, at times, between the elements in corresponding linkage groups; and it states that the frequency of crossing-over furnishes evidence of the linear order of the elements in each linkage group and of the relative position of the elements with

respect to each other.

These principles, which taken together, I have ventured to call the theory of the gene, enable us to handle problems of genetics on a strictly numerical basis, and allow us to predict, with a great deal of precision, what will occur in any given situation. In these respects the theory fulfills the requirements of a scientific theory in the fullest sense. . . .

To What is the Mutation Process Due?

There remains . . . a problem of some interest, namely, whether some or many of the changes in the genes that lead to the occurrence of mutant characters (whether recessive, intermediate, or dominant makes little difference) may not be due to a breaking up of a gene, or to its reconstitution into another element producing somewhat different effects. There is, however, no reason for assuming that such change, if it occurs, is a downhill one rather than the development of a more complex gene, unless it appears more probable, *a priori*, that a highly complex stable compound is more likely to break down than to build up. Until we know more concerning the chemical constitution of the genes, and how they grow and divide, it is quite futile to argue the merits of the two sides of the argument. For the genetic theory it is only necessary to assume that any kind of a change may suffice as a basis for what is observed to take place.

It is equally futile to discuss, at present, whether new genes arise independently of the old ones, and worse than futile to discuss how the genes arose in the first instance. The evidence that we have furnished no grounds whatsoever for the view that new genes independently arise, but it would be extremely difficult, if not impossible, to show that they do not arise. . . .

Are Genes of the Order of Organic Molecules?

The only practical interest that a discussion of the question as to whether genes are organic molecules might have would relate to the nature of their stability. By stability we might mean only that the gene tends to vary about a definite mode, or we might mean that the gene is stable in the sense that an organic molecule is stable. The genetic problem would be simplified if we could establish the latter interpretation. If, on the other hand, the gene is regarded as merely a quantity of so much material, we can give no satisfactory answer as to why it remains so constant through

all the vicissitudes of outcrossing, unless we appeal to mysterious powers of organization outside the genes that keep them constant. There is little hope at present of settling the question. A few years ago I attempted to make a calculation as to the size of the gene in the hope that it might throw a little light on the problem, but at present we lack sufficiently exact measurements to make such a calculation more than a speculation. It seemed to show that the order of magnitude of the gene is near that of the larger-sized organic molecules. If any weight can be attached to the result it indicates, perhaps, that the gene is not too large for it to be considered as a chemical molecule, but further than this we are not justified in going. The gene might even then not be a molecule but only a collection of organic matter not held together in chemical combination.

When all this is given due weight it nevertheless is difficult to resist the fascinating assumption that the gene is constant because it represents an organic chemical entity. This is the simplest assumption that one can make at present, and since this view is consistent with all that is known about the stability of the gene it seems, at least, a good working hypothesis.

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ORNITHOLOGY

Pigeon Vaccine Prevents Fowl Pox

CHICKENS can now be protected from fowl pox, a highly infectious disease that often plays havoc with flocks, by a new vaccine made from pigeons. The vaccine was developed by Capt. T. M. Doyle of the Veterinary Laboratory, Ministry of Agriculture for Great Britain.

Fowls treated with it acquire immunity against fowl pox both under laboratory conditions and also in ordinary commercial practice. The immunity is fully established about the fourteenth day after the chickens are inoculated.

The vaccine does not give rise to any loss of condition or constitutional disturbance, nor does it seem to interfere with egg production. During the past six months, 50,000 doses of the vaccine have been given to infected fowls. The results were all excellent except in one case, and in that case it is just possible that the fowl was suffering from some disease other than fowl pox.

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Observations of Eros,

The smallest planet, which this month has been brought by its eccentric orbit nearer the earth than any other heavenly body with the exception of the moon, will be reviewed

BY ITS DISCOVERER

In Next Week's Classic of Science

ASTRONOMY

Possible New Northern Light Like Celestial Searchlight

Observation of Mysterious Bluish White Beam Moving From East to West Has Been Reported Three Times

THREE observations of a mysterious beam sweeping across the heavens from east to west, like a celestial searchlight, and probably some form of aurora, or northern lights, have come to the attention of the Harvard College Observatory at Cambridge, Mass. J. L. Dunham reported seeing the phenomenon during August, having observed it from a camp near Greensboro, in northern Vermont.

According to Mr. Dunham, it stretched from the eastern horizon to the western, passing close to the zenith, the point directly overhead. It was about a degree wide, he said, and in about 15 minutes moved a little to the south. He observed it from 9.55 to 10.12, when clouds interfered, and by 10.45, when it cleared, the band of light had disappeared. It was sharply defined, he said, and bright enough to obscure all but the brightest stars behind it. It was not colored, like a rainbow, but appeared bluish white, like the ordinary aurora.

Confirmation of Mr. Dunham's observation is contained in a report to *Science* by Dr. Charles F. Brooks, professor of meteorology at Clark University. Dr. Brooks at the time was near Littleton, N. H., about 27 miles to the east and 15 miles to the south of Mr. Dunham. He saw it at 9.50 the same evening until 10.15. When he first saw it, it extended from east to west, directly overhead, but he states that it slowly moved south, at a speed of about 10 degrees in 10 minutes.

"During the last ten minutes," he said, "the beam was distinctly south of the zenith and during the last five faded rapidly and broadened till it was scarcely noticeable." At this time he found it to be about five degrees wide.

Dr. Brooks also said that he had noticed a beam of the same sort several years ago from Silver Lake, N. H. Another similar beam was seen from Cambridge on the night of August 6, at 1.50 A. M., by L. E. Cunningham and E. M. Lindsay. They also reported that the beam was similar to a searchlight, passed directly overhead from east to west and

had sharply defined edges. They estimated its width at about three degrees.

Whatever the beam was, it was probably very high, for both Dr. Brooks and Mr. Dunham saw it practically overhead, even though one was about fifteen miles farther north than the other. Dr. Brooks suggests that it may have been an auroral arch of the ordinary kind, which lost its arch-like appearance when directly overhead and one looked up inside it. Both Dr. Brooks and Mr. Dunham reported seeing other displays of northern lights the same night. Mr. Cunningham also noticed a number of meteors the same night that he saw the effect, but these were probably merely adventitious.

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GEOLOGY

Mammoth Beryl Crystal Added to Famous Collection

A MAMMOTH crystal of beryl, weighing approximately 1,000 pounds, has been presented to the Field

MINING

U. S. Radium May Compete With Foreign Product

IT WOULD be possible for the U. S. Bureau of Mines to manufacture one gram of radium from vanadium-uranium-radium ores in Colorado and Utah, at a cost comparable to the price for which radium can be purchased from the Belgian Congo.

Dr. G. F. Loughlin of the Geological Survey has made a survey of the mines in these states and has reported to the House Committee on Mines and Mining. This committee expects to have a hearing on a bill introduced by Representative Clyde Kelly of Pennsylvania,



A HUGE EMERALD

Might have been formed had this great crystal of beryl received slightly different treatment during age-long geological processes.

Museum of Natural History, Chicago, by William J. Chalmers, a trustee of the institution. It is three feet two inches long and has a diameter of two feet at the base, the widest part. It was discovered in a quarry at Albany, Me.

The crystal will be the largest specimen in the famous Chalmers crystal collection of the museum, and is a striking illustration of the size to which crystals may grow.

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which directs the Bureau of Mines to produce one gram of radium from domestic sources for use in government hospitals.

Representative Kelly is in favor of increasing this to three or four grams.

In the mines in question, uranium used to be the product sought, but the ores are worked chiefly today for vanadium. Uranium and radium could be extracted from the vanadium ores as by-products, so that the chief cost of mining and exploration could be borne by the vanadium production. Dr.



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Loughlin suggests the addition of uranium units to existing vanadium plants or the building of new mills for the extraction of both vanadium and uranium. Of late years uranium has been mined only by gouging out small quantities to sell to manufacturers of radium belts and radio-active waters.

Although warning that his estimate is only a guess, Dr. Loughlin says he

believes that radium could be extracted from these ores at a cost of \$50 a milligram.

It is expected that the House Committee will probably report favorably the Kelly bill. Representative Kelly believes that the Belgian monopoly on radium should be broken. The price of radium from the Belgian Congo is now about \$60,000 per gram.

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NUTRITION

More Food Value in Sweet Than in Irish Potato

SWEET potatoes are of higher food value than white potatoes, contrary to common belief.

The protein of the sweet potato, ipomoein, is richer in the nutritionally-essential amino-acids that compose proteins than that obtained from the white variety. This has been shown in Washington by Dr. D. Breese Jones and his collaborators in the Bureau of Chemistry and Soils of the U. S. Department of Agriculture.

Proteins, those complex compounds of nitrogen, are necessary constituents of any diet. Ordinarily we obtain our greatest amounts of these from meat, eggs or milk. Potatoes and sweet potatoes are more important as sources of starch or fuel-energy-giving material, as are also the cereal foods.

Potatoes of both kinds, however, contain proteins that are superior in nutritional quality to those of corn and white bread. They contain a greater proportion of the essential building materials for human nutrition.

The sweet potato has a further advantage, Dr. Jones finds. He has isolated and studied protein from seven or eight varieties. Not all of the nitrogen in white potato is due to protein, but to other substances of less food value. These are not found in the sweet potato.

The sweet potato is also very satisfactory in regard to its content of the essential vitamins. The common potato contains less vitamin A. Thus the sweet potato has much to recommend it as a balanced food.

The potato has been claimed by Dr. M. Hindhede of Denmark as the perfect food. The sweet potato is largely unknown in Europe though it was probably introduced there a hundred years before the common "spud."

It is even mentioned in Shakespeare. It looks as if the Danish enthusiast might have to transfer his attention now to the all-American product.

Sweet potato flour can be added to wheat flour in making bread, with satisfactory results. A process has also been worked out by the Bureau of Chemistry and Soils for making syrup from sweet potatoes.

Sweet potatoes form one of the chief vegetable foods in the southern states. The Department of Agriculture suggests that a larger percentage of the crop than at present might be fed to farm animals as it constitutes a cheaper and more productive source of carbohydrate, or fuel-energy material than corn as a supplement to such protein concentrate feeds as cottonseed, peanut and soybean meals.

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BIOLOGY

Embalmed Gorillas Secured for New York

SEVERAL embalmed bodies of full-grown gorillas, including one specimen of the extremely rare mountain gorilla of the Kivu region, are now available for anatomical study by scientists of Columbia University and the American Museum of Natural History. Announcement of this acquisition, rarest prize known to anatomical science, was made in Cleveland by Dr. William K. Gregory, speaking before the American Association of Physical Anthropologists.

Science News Letter, January 17, 1931

Fossil leaves with autumn coloring have been found in Oregon, the coloring being due to iron oxide.

ZOOLOGY

Nature Ramblings

By FRANK THONE



Winter Garments

FASHIONABLE ladies, who insist on one set of furs for summer wear and another for winter, have nothing on a whole series of their lesser cousins in the woods. There are many mammals and birds that with the onset of winter change color so radically that one would take the two phases of the animal to be two quite distinct species if one were not in on the secret. Animals or birds that are brown or dark gray in the summer become snow-white in the winter.

This shift from ground-color to snow-color is declared by naturalists to be the original, untaught camouflage whereby animals like the Arctic hare and the ptarmigan seek to avoid their enemies, and others, like the Arctic fox, seek to creep up on their prey unobserved. When it is found in animals that usually play the role of the hunter it is called "concealing coloration"; when in animals that are commonly the hunted it is known as "protective coloration." It seems to be a game that works both ways. And presumably there are small beasts of prey that might themselves become the prey of larger carnivores; in their case the camouflage might conceivably have a double usefulness.

Just what to make of the polar bear, under this scheme of things, is not easy to determine at first. Here is an animal beautifully provided with concealing coloration in the winter, but because he obstinately keeps his winter coat all summer it looks as though he would be unprofitably conspicuous when the Arctic sun is high. But when it is remembered that he spends much of his time on the pack ice, even in summer, one can see the usefulness, in his case, of wearing one's January coat in July.

Science News Letter, January 17, 1931

ETHNOLOGY

Indians Were Peaceable People Made Warlike by Whites

THE American Indian was never a really warlike individual, except in isolated instances. It was the injustice of the early white settlers that made him stand up for his rights and so gave him the reputation for belligerency, declared Dr. M. W. Stirling, chief of the Bureau of American Ethnology of the Smithsonian Institution, speaking in a radio talk presented by Science Service through the nation-wide network of the Columbia Broadcasting System.

"In the year 1608", said Dr. Stirling, "Edward Harlow was sent in a ship by Captain John Smith of the new Jamestown colony to explore the Cape Cod region. When he landed there and the Indians came out to meet him, he seized five of them and carried them off, taking them with him to England. The next touch of hospitality encountered by the Indians of the Plymouth region was when Thomas Hunt was sent there from Jamestown in 1614 to determine the desirability of the site for colonization.

Deceived by Explorers

"When he landed the Indians came to meet him in a friendly manner. He invited them on his ship and as soon as they were aboard clapped them all, twenty-four in number, under hatches and carried them off to sell as slaves to the Spaniards. One of the Indians who later escaped was brought back to Plymouth by Captain Dermer who attempted to regain the good will of the Indians of the region in 1619. However, the natives, in view of what happened on the two previous visits, were not in a mood to parley.

"Despite his reputation to the contrary, the Indian was not by nature particularly warlike. Tribes that in later days bitterly obstructed the invasion of the whites, were invariably on first contact, friendly and hospitable.

"Some of the tribes of the Great Plains practised a peculiar sort of warfare as a manner of gaining individual prestige, and the Aztecs seemed to be on the verge of developing an idea unique among Indians: That of supporting themselves by conquest. Most Indians, however, avoided fighting whenever

possible, but fought fanatically when driven to it.

"Warfare among the Indians was not as a rule a tribal matter excepting in the case of defensive fighting for mutual protection. War parties were organized by individuals, usually adventurous young men. Anyone might organize such a party and collect such volunteers as would accompany him. Frequently wiser old men would attempt to dissuade such an exploit but no one had authority to prohibit such a venture. Actual fighting was as a rule by ambush or surprise attack. Military tactics were never used until the benefits of organized fighting were learned from the whites."

Science News Letter, January 17, 1931

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• First Glances at New Books

Entomology—History of Science

A HISTORY OF APPLIED ENTOMOLOGY—L. O. Howard—*Smithsonian Institution*, 564 p., 51 pl., \$2.25. Whoever has heard L. O. Howard talk will need no inducement to order this book. The note in parenthesis after the title: "(Somewhat Anecdotal)" is sufficient index to the initiate. The book is like the author's memory, as set forth in numberless noteworthy evenings in Washington scientific societies: stored with an amazing mass of accurate information, relieved by illuminating highlights on the personalities of noted colleagues, spiced with chuckle-provoking bits of dry wit. It will be bought and read not merely by entomologists but by scholarly inclined persons of all varieties of scientific interest.

Science News Letter, January 17, 1931

Horticulture

HORTUS—L. H. Bailey and Ethel Zoe Bailey—*Macmillan*, 652 p., 16 pl., \$10. This book contains, in exceedingly condensed form, the meat of the classic three-volume *Cyclopedia of Horticulture*. For those who do not have the larger set this volume will fill the bill excellently; for those who have it, it will supplement and bring the data down to 1930.

Science News Letter, January 17, 1931

Hygiene

FOOD AND HEALTH—A. Barbara Callow—*Oxford*, 96 p., 2s 6d. This is one of those exceedingly useful little books, small and light enough to carry in a pocket, but packed with the gist of information that usually bulks up much bigger volumes. The author, being employed in the most modern of British food laboratories, has access to the very latest developments in the fields of foods and food chemistry.

Science News Letter, January 17, 1931

Geography

BRADFORD ON MOUNT FAIRWEATHER—Bradford Washburn—*Putnam's*, 127 p., \$1.75. Alpinists and outdoorsmen generally will be interested in this rapidly told story of an assault upon one of Alaska's grandest mountains.

Science News Letter, January 17, 1931

Horticulture

THE CACTUS BOOK—A. D. Houghton—*Macmillan*, 147 p., \$2.25. Cacti, whether in attractive little pots at the florist's or in elaborately worked-out

rock plantings in private and public gardens, are enjoying an increasing horticultural vogue. A horticultural literature is therefore in order. This book will serve as an excellent introduction for the beginner, and will be useful also to the veteran cactophile.

Science News Letter, January 17, 1931

Botany

FLORA OF YUCATAN—Paul C. Standley—*Field Museum*, 492 p., \$2. Yucatan, as an important tropical agricultural region, and with a growing popularity as a resort for educated travellers, has a real need for a full scientific literature on its plant and animal life. This book, by a well-established author in the field of neotropical botany, will therefore be welcomed.

Science News Letter, January 17, 1931

Design—Bibliography

NATURE INDEX—Jessie Croft Ellis—*Faxon*, 319 p., \$3. A compilation of 5,000 selected references to nature forms and illustrations of nature in design, painting and sculpture.

Science News Letter, January 17, 1931

Social Science—Agriculture

THE PLACE OF AGRICULTURE IN AMERICAN LIFE—Wilson Gee—*Macmillan*, 217 p., \$2. This brief but comprehensive essay on the social and economic significance of American agriculture comes at a most opportune time.

Science News Letter, January 17, 1931

Zoology

THE SOUTH AMERICAN LIZARDS IN THE COLLECTION OF THE UNITED STATES NATIONAL MUSEUM—Charles E. Burt and May Danheim Burt—*Smithsonian*, 52 p., free. An annotated catalog.

Science News Letter, January 17, 1931

Botany

OUR PLANT FRIENDS AND FOES—William Atherton DuPuy—*Winston*, 277 p., 80 cents. Twenty-five chapters of very popular botany, constituting a continuation of a "Friends and Foes" series by the same author.

Science News Letter, January 17, 1931

Anthropology

AN INTRODUCTION TO PHYSICAL ANTHROPOLOGY—E. O. Stibbe—*Longmans, Green*. A brief textbook, very systematically written and diagrammatically illustrated, for the use of beginning students.

Science News Letter, January 17, 1931

Natural History

RANDOM GLEANINGS FROM NATURE'S FIELDS—W. P. Pyecraft—*Hale, Cushman and Flint*, 210 p., \$2.50. Americans have become acquainted with Mr. Pyecraft's wide knowledge of natural history and his charming style in presenting what he knows, largely through the pages of the *Illustrated London News*. They will welcome this collection of selected essays from this series.

Science News Letter, January 17, 1931

Physiology

THE REGULATION OF SIZE AS ILLUSTRATED IN UNICELLULAR ORGANISMS—E. F. Adolph—*Thomas*, 233 p., \$4.50. Before we can answer some of the complicated questions about rate and limitations of growth in the higher organisms, including ourselves, we will have to understand the fundamental principles underlying size regulations. Prof. Adolph has taken the relatively simpler situations faced by unicellular organisms as his point of attack.

Science News Letter, January 17, 1931

Zoology

MY LIFE WITH ANIMALS—George F. Morse—*Rockwell*, 196 p., \$2. The author turns his long acquaintance with animals, both in two famous zoological gardens and in the wild, to good account in a running series of interesting anecdotal accounts.

Science News Letter, January 17, 1931

Protozoology—Paleontology

A MONOGRAPH OF THE FORAMINIFERAL FAMILY POLYMORPHINIDAE RECENT AND FOSSIL—Joseph A. Cushman and Yoshiaki Ozawa—*Smithsonian Institution*, 195 p., 40 plates. Of interest to paleontologists and students of the protozoa generally.

Science News Letter, January 17, 1931

Bacteriology

PRINCIPLES OF BACTERIOLOGY—Arthur A. Eisenberg and Mabel F. Huntly—*Mosby*, 322 p., \$2.50. The fourth edition of a successful text written especially for the use of student nurses.

Science News Letter, January 17, 1931

Paleontology

ON DINOSAURIAN SPECIES FROM THE TWO MEDICINE FORMATION OF MONTANA—Charles W. Gilmore—*Smithsonian*, 39 p., 10 pl., free. Description and figures of two new species.

Science News Letter, January 17, 1931